

Claim 83, Line 2, delete "a" before "elemental carbon";

Claim 84, Line 2, delete "a" before "elemental carbon";

Claim 181, Line 2, delete "a" before "elemental carbon";

Claim 204, Line 2, delete "a carbon source" and insert therefor --elemental carbon--;

Claim 213, Line 2, before "elemental carbon", delete "a";

Claim 222, Line 2, before "elemental carbon", delete "a";

Claim 230, Line 2, before "elemental carbon", delete "a".

REMARKS

The Office Action has rejected Claims 45-84, 96, 181 and 203-231 under 35 U.S.C. §112, second paragraph, for allegedly failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. In addition, Claims 45-82 and 96 are rejected under 35 U.S.C. §112, first paragraph, as allegedly containing subject matter which is not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventor had possession of the claimed subject matter at the time that the application was filed. Further Claims 45-82 are rejected under 35 U.S.C. §112, first paragraph, as allegedly being non-enabling. Claims 45-84, 90, 181 and 203-331 are rejected under 37 C.F.R. §1.78(b) for allegedly conflicting with Claims 57-63, and 68-87 of USSN 08/486,669. Furthermore, Claims 45-84, 96, 181 and 203-231 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being

unpatentable over Claims 57-63 and 68-87 of copending Application USSN 08/486,669. Finally, Claims 45-54, 96, 181 and 203-231 are rejected under 35 U.S.C. §103(a) as defining subject matter which is allegedly rendered obvious by the teachings in an article by Kratschmer, et al. in Chemical Physics Letters, 1990, 170, 167-170 ("Kratschmer, et al.") in view of U.S. Patent No. 3,094,428 to Hamilton, et al. and ("Hamilton, et al.") in view of an article by Kargin, et al. in Colloid Journal of the USSR, 1967, 29, 256-259 ("Kargin, et al.").

In response thereto, applicants have amended the claims, and are submitting herewith a Declaration by Dr. Kratschmer, which, when considered with the comments hereinbelow, are deemed to place the present case in condition for allowance. Favorable consideration is respectfully requested.

Applicants have amended each of the main independent claims to delete the word "a" prior to the term "elemental carbon" so that the claims recite that elemental carbon is being vaporized. Thus, any ambiguity that may have been present in the claims heretofore has now been eliminated. In addition, applicants have also clarified the amendments to Claim 67 and Claim 204 that were made in the previous Amendment. As Claim 67 and 204 now read, elemental carbon, not a carbon source, is being vaporized in the first step of the process.

The Office Action has rejected Claims 45-84, 96, 181 and 203-231 under 35 U.S.C. §112, second paragraph, for three reasons. The amendment described hereinabove overcomes the first reason for this rejection.

With respect to the second reason proffered by the United States Patent and Trademark Office, the Office Action

alleges that it is not clear in Claim 181 how much constitutes "amounts...capable of extracting and recovering therefrom said allotrope in solid form".

Applicants request clarification of the rejection since the language recited on Page 2 of the Office Action is not found in Claim 181. More specifically, the term "allotrope" is not recited anywhere in Claim 181. The claim is directed to a process for making C₆₀, and the claim recites that the C₆₀ is present in the soot in amounts capable of extracting and recovering predominantly therefrom said C₆₀ in solid form. Moreover, applicants submit that the language recited in the Office Action is not found in the other claims pending in this application. Therefore, clarification is requested as to which claim reference is being made.

If reference is being made to Claim 181, and if the issue is to the "amount" recited therein, applicants submit that the language used is non-ambiguous and clearly defines the metes and bounds of the invention.

Claim 181 recites that C₆₀ is present in both the soot and the extract from the soot in such amounts that it can be recovered therefrom in amounts that could be seen with the human eye. The claims connote this amount in functional language by reciting that the C₆₀ is present in amounts capable of extracting C₆₀ from the soot in solid form and that it is recovered as a solid. Applicants submit that the presence or absence of sufficient material to be visible as a solid is a characteristic that is easily determinable.

However, the Office Action alleges that such a limitation is indefinite, and specifically asks "... if ... a microgram of C₆₀ was an amount needed to qualify as solid C₆₀, would a process which produced a kilogram of soot which in toto contained microgram of C₆₀,... be within the claims...?" In

addition, the Office Action raises the question, "what is the lower limit?" First, case law has held that lower limits need not be recited to comply with 35 U.S.C. §112, second paragraph. See, In re Kirsch, 498 F.2d 1389, 1393-1394, 182 U.S.P.Q. 286, 290 (CCPA 1974). But, more importantly, how can anything be more definite than visible versus not visible? From the beginning of time, man has relied upon his senses to determine if something is present, hence the adage "seeing is believing". The amount of C₆₀ and/or C₇₀ produced by the process of the present invention is in macroscopic amounts, amounts which are definitely discernible by the human eye. Thus, there is no indefiniteness in the amount produced. The objective test is whether visible amounts, that is, amounts sufficient to see, touch, and feel of C₆₀ and/or C₇₀ are recovered. What can be more clear than that?

With respect to the rejection of Claims 83, 84, and 222, the Office Action alleges that the language, "amount (or quantities) (of C₆₀) sufficient to be capable of producing a colored solution when extracted with sufficient (or effective) amounts to benzene" is unclear. Applicants disagree for the same reasons as hereinabove. This language connotes that sufficient (C₆₀ or C₇₀) is present so that when dissolved in a non-polar organic solvent, such as benzene, the benzene will become colored. Again, this is an objective test of whether appreciable amounts of C₆₀ and/or C₇₀ are formed. If the benzene solution remains uncolored when the soot comprising C₆₀ and C₇₀ is placed into sufficient benzene to dissolve the C₆₀ and/or C₇₀, then insufficient amounts of product are generated; on the other hand, if the benzene solution becomes colored, then sufficient amount of C₆₀ or C₇₀ is generated. The U.S.P.T.O. raises the issue that this is indefinite, alleging that visual acuity varies from person to person; however, the

test is color versus no color, i.e., something which is easily determinable and discernible, and which is an objective rather than subjective standard.

In both situations, the U.S.P.T.O. has failed to consider the history regarding fullerenes. Heretofore, no one had generated enough fullerenes, such as C_{60} , to be seen with the naked eye, or as indicated in Curl, et al., in Scientific American, 1991, Page 55, when dissolved in benzene produced a colored solution. Others heretofore could not generate sufficient amounts of C_{60} to obtain a colored solution. For example, when Smalley, et al. placed the soot they produced in benzene, the solution remained clear and the black soot sat on the bottom of the liquid. Id. However, the methodology of the present process produces such appreciable amounts of C_{60} and/or C_{70} that they can be visibly seen and they produce a colored solution when the entire product of C_{60} and/or C_{70} extracted from the soot is placed into benzene. Not only does this distinguish over the prior art, but as indicated hereinabove, these are simple tests to easily ascertain whether the requisite amount of product is produced.

The Office Action appears to have misinterpreted the claims; it utilizes as the standard the amount of sooty carbon product produced which when placed into benzene forms a colored solution. The claims do not use this as the criteria, since the soot goes to the bottom of the liquid. The color is formed when sufficient amounts of C_{60} and/or C_{70} are present in the soot sample. Thus, if a colored solution is produced under these circumstances then it meets the test recited in Claims 83, 84 and 222.

Applicants submit that this language in the claims clearly delineates the metes and bounds of the claims.

Thus, for the reasons provided, the rejection of the claimed subject matter under 35 U.S.C. §112, second paragraph, is obviated. Withdrawal thereof is respectfully requested.

Pursuant to the rejection of Claims 45-82 and 96 under 35 U.S.C. §112, first paragraph, the Office Action alleges that the specification does not have descriptive support for this term "macroscopic".

Applicants strongly disagree.

With respect to the description requirement, there is adequate support in the application for the term "macroscopic". Literal support is not necessary for compliance with the description requirement as long as the application conveys the concept to the skilled artisan. This the application adequately does. More specifically, support for this term and concept permeates the specification. For example, attention is directed to Page 7, Lines 10-25, and to Example 1 of the instant specification wherein it is specified that the C₆₀ product is obtained as a powder and wherein the color of the product produced therefrom is indicated. Moreover, attention is directed to Page 7, Lines 10-25 in addition, wherein the specification describes that when the sooty product is placed into a non-polar solvent, e.g., benzene, the benzene became colored and the product produced after extraction with the non-polar solvent is colored. Obviously, one cannot determine these characteristics unless it is present in amounts that can be seen with the naked eye, i.e., macroscopic amounts. If less than macroscopic amounts were produced, no color would be seen. See, Curl, et al, Scientific American 1991, 54-55. Furthermore, attention is directed to Figure 2, of the instant specification wherein a X-ray diffraction pattern is provided of a product produced in accordance with the present invention. As the skilled artisan is well aware, macroscopic quantities

had to be available to generate a X-ray diffraction of the product. In addition, attention is directed to Page 11, Line 30 of the instant specification wherein it is indicated that the IR is taken of an approximately two micrometer thick C_{60} coating on a silicon substrate. Especially since C_{60} is colored, it is obvious that this coating had to be seen with the naked eye. Furthermore, the application makes additional references to characteristics of the product that can only be discernible if the material is present in macroscopic amounts. For example, the application describes that the product produced by sublimation of the carbon soot can range from a uniform film to a coating, and the color is brown to gray depending on the thickness of the coat formed, while the product obtained from extraction is a dark brown to black crystalline material. Obviously, these characteristics can be differentiated if the product was produced in amounts that can be seen with the human eye. In addition, on Page 2, Line 13, the application states that before the prior invention, no one had made C_{60} or C_{70} in appreciable amounts. The implication is that the present inventors were successful in achieving this goal, consistent with the teachings in the application. Appreciable by definition means "enough to be perceived", See Webster Unbridged Dictionary 2nd Ed. p. 91 (1983). Thus, appreciable is synonymous with "macroscopic".

It is important to keep in mind that which was not stated; if the products produced can only be detected through instrumentation, such representation would have been made in the application and evidence supporting same such as electron micrographs would have been provided. In fact, the application acknowledges that C_{240} was observed from a scanning tunneling microscopic image. The fact that such statements were not made and such evidence was not provided with respect to C_{60} and C_{70} ,

for example, is further evidence that these products were formed in macroscopic amounts.

Case law has held that the description requirement is met if the application conveys to the skilled artisan that the applicants has possession of the invention at the time of the filing of the application. Vas Cath Inc. v. Mahurkar, 935 F.2d 1535, 19 USPQ2d 1111 (Fed. Cir. 1995). In other words, the applicant must convey with reasonable clarity to the skilled artisan that as of the filing date he or she was in possession of the invention. Vas Cath Inc., 935 F.2d at 1563-64, 19 USPQ 2d at 1117. Attention is directed to the Kroto Declaration previously submitted, Paragraphs 14 and 15, in which he attests that the application adequately describes the method for making macroscopic amounts of fullerenes, such as C₆₀ and C₇₀ and that based upon the teachings in the application, it is his opinion that the inventors had in their possession at the time of the filing of the application macroscopic amounts of same. (Emphasis added). Kroto, who is a skilled artisan in the field, understood from reading the application that the applicants had made macroscopic amounts of fullerenes and had it in their possession at the time of the filing of the application, providing further evidence that there is adequate support in the specification for the term "macroscopic". Since a skilled artisan testified that the application describes the production of fullerenes, such as C₆₀, in macroscopic amounts, how can the United States Patent and Trademark Office ignore a statement from the skilled artisan that he understood from reading the application that applicants had made macroscopic amounts of fullerenes, e.g. C₆₀ or C₇₀? Case law had held that if a person of ordinary skill in the art would have understood from reading the specification that the inventor had possession of the claimed invention at the time of filing the application,

then the written description required by 35 U.S.C. §112, first paragraph, is met. In re Alton, 76 F.3d 1168, 37 USPQ2d 1578 (Fed. Cir. 1996). Since Dr. Kroto so testified, then the written description requirement is met. Id.

Thus, the application fully complies with the description requirement of 35 U.S.C. §112, first paragraph.

In addition, the specification fully complies with the enablement requirement of 35 U.S.C. §112, first paragraph, and adequately teaches one skilled in the art how to make the claimed invention without an undue amount of experimentation. The specification provides the general teaching to the skilled artisan of how to prepare C₆₀ and C₇₀ in macroscopic amounts. If the skilled artisan follows the procedure described in the specification, macroscopic amounts of material would be produced. Attention is again directed to the Declaration of Kroto, paragraphs 3, 8 and 15, wherein he attests that the application adequately describes how to make fullerenes, including C₆₀ and C₇₀, in macroscopic amounts. Contrary to the allegations in the Office Action, case law does not require the applicant to describe in their specification every conceivable embodiment of the invention. US v. Teleelectronics, 857 F.2d 778, 786, 8 USPQ 2d 1217, 1222 (Fed. Cir. 1988) (citing SRI Int'l v. Matsushita Elec. Corp. of America, 775 F.2d 1107, 1121, 227 USPQ 577, 586 (Fed. Cir. 1985)). It is not therefore necessary to specifically exemplify that tonnage quantities can be made in accordance with the present process. The specific teachings and exemplification in the specification provide an adequate teaching to accomplish this objective without an undue amount of experimentation. Again, it is improper for the United States Patent and Trademark Office to ignore the testimony of Dr. Kroto, a skilled artisan, who testified that

the application adequately describes to the skilled artisan how to make macroscopic amount of C_{60} .

In the rejection, the Official Action states that the original language of the specification only supports the production of C_{60}/C_{70} in quantities sufficient to produce coatings that are 2 microns thick. This amount produced is described in Ex. 1, and is only exemplary of the amount of product that could be produced by the present process. However, the United States Patent and Trademark Office is utilizing an engineering issue involving "scaling up" to support its allegation of lack of enablement. This is contrary to case law. There is nothing in the law which requires the applicants to scale up in the application the "amount" of products prepared by their process. This is an inappropriate basis for supporting an allegation of non-enablement. Even if some experimentation is required, case law had held that if the amount of experimentation is not duly extensive, the specification is still enabling. U.S. v. Teletronics, Inc., 857 F.2d 778, 8 USPQ2d 1217 (Fed. Cir. 1988), cert denied, 490 US 1046 (1989). Applicants submit that based upon the teachings in the specification, an undue amount of experimentation is not required to produce larger amounts of C_{60} . For example, based upon the teachings, the skilled artisan can scale up the amount of product produced without an undue amount of experimentation. For example, if a greater amount of elemental carbon were used, additional material would be collected. Moreover, if the exact methodology in Ex. 1 were repeated an infinite amount of times, there can be no question that an infinite amount of material would be collected. Dr. Kroto understood that undue amount of experimentation was not required to prepare macroscopic amounts of C_{60} and C_{70} , based upon his reading of the specification, why can't the United

States Patent and Trademark Office? Thus, it is absurd for the United States Patent and Trademark Office to state that the application is not enabling for the larger quantities of product to be produced.

Thus, the application is enabling for the subject matter claimed. Therefore, the rejection of the claims under 35 U.S.C. §112, first paragraph, is obviated, and withdrawal thereof is respectfully requested.

Thus, the specification complies with the requirements of 35 U.S.C. §112, first and second paragraphs.

Withdrawal of these rejections is respectfully requested.

With respect to another rejection of Claims 45-84, 96, 181, 203-231, the Office Action cites 37 C.F.R. §1.78(b) in support of its rejection that these claims conflict with Claims 57-63 and 68-87 of the '669 application. The Office Action requests Applicants to either cancel the conflicting claims or to maintain a clear line of demarcation between the applications. This is an improper rejection since there is no statutory basis for the rejection. Nevertheless, there is a line of demarcation between the claimed subject matter in the present application and the claims in copending application USSN 08/486,669. The present case is directed to a process of preparing C₆₀ and or C₇₀ or products containing same, while the copending application is directed to processes for preparing fullerenes and/or products containing same. Thus, there is a clear line of demarcation between the applications.

The Office Action maintains that to constitute a clear line of demarcation, it is necessary that the claims in the application be patentably distinct. This of course, is contrary to practice and case law. Although applicants believe that the applications are directed to patentably distinct

inventions, this is not the standard. For example, attention is directed to MPEP §806.04 (i), which permits an application directed to a genus to issue even after the application to a species issues. Thus, it is permissive to have one application directed to a species and another application directed to a genus, as in the present circumstances. Thus, the rejection of the claims under 37 C.F.R. §1.78(b) is improper, and withdrawal thereof is respectfully requested.

Pursuant to the provisional rejection of Claims 45-84, 96 and 160-231 under the judicially created doctrine of obviousness-type double patenting, the Office Action cites Claims 45-68 of copending application USSN 08/486,669.

Since the claims in neither application has been patented, it is premature to reject the claims on this ground at this time, especially since these may not be the final version of the claims. When one of the applications matures into a patent, then it would be the appropriate time to raise this issue.

In addition, applicants further submit that the provisional double patenting rejection is not applicable in the present circumstances.

In considering the question of obviousness-type double patenting, only the claims of the two applications are compared. Quad Environmental Technologies, Corp. v. Union Sanitary District, 946 F.2d 870, 873, 20 U.S.P.Q. 2d 1392, 1394. The question to consider is whether any claims in the two applications define merely an obvious variation of an invention disclosed and claimed. In re Vogel, 442 F.2d 438, 441, 164 U.S.P.Q. 619, 622 (CCPA 1970).

The Office Action alleges that the claims are not patentably distinct from each other because the respective claims only differ in the functional recitation of how much C₆₀

fullerene is made in the carbon vaporization process. It further alleges that the subject matter in both applications is directed to the production and recovery of C₆₀ fullerenes. However, applicants respectfully submit that the claims in the two applications do not differ in the manner alleged in the Office Action. The present application is directed to a process of making C₆₀ and/or C₇₀ in macroscopic amounts, while the '669 application is directed to the process of making fullerenes in macroscopic amounts. The subject matter of the present application is thus not directed to the same patentable invention as that claimed in the copending '669 application. Consequently, the rejection of the claimed subject matter on these grounds is obviated, and withdrawal thereof is respectfully requested.

Pursuant to the rejection of Claims 45-54, 58, 62-63, 65-78, 83-84, 96, 160-163, 167-169, 171-183, 187-188, and 192-202, the Office Action cites Kratschmer, et al. in view of Hamilton et al. and Kargin, et al.

Kratschmer, et al. describe a process of preparing carbon smoke particles by evaporating graphite rods by resistive heating in a conventional glass bell evaporator filled with an inert quenching gas such as helium at pressures greater than, for example, 100 Torr. It also discloses collecting the smoke. The article postulates that C₆₀ may be present in the smoke. But, in contrast with the present invention, the reference does not teach, disclose or suggest how to extract the C₆₀ from the soot. Thus, the reference never separated the C₆₀ from the soot.

The Office Action agrees, and it cites Hamilton, et al. and Kargin, et al. to allegedly overcome this deficiency.

According to the Office Action, Kargin, et al. disclose that carbon particles made from the condensation of

carbon vapor in an argon atmosphere can be deemed to be carbon black. The Examiner further alleges that the carbon particles were prepared from a graphite anode and cathode opposed to one another, wherein a plasma is formed therebetween by passing current to the electrodes. The Office Action then cites Hamilton, et al., alleging that it discloses that carbon black is dispersed in benzene to form ink compositions. The Office Action concludes that it would have been obvious to have dispersed the carbon smoke particles of Kratschmer, et al. in benzene because Hamilton, et al. "teach that it is known to disperse carbon black in benzene in order to form ink compositions or rubber compositions and because Kargin, et al. would teach...to recognize Kratschmer's particle as being carbon black."

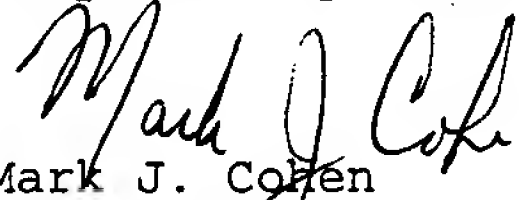
Kratschmer, et al. is not a proper reference. The article list three authors, Kratschmer, Huffman and K. Fostiropoulous. Case law had held that authorship of an article by itself does not raise a presumption of inventorship with respect to the subject matter disclosed in that article. In re Katz, 687 F.2d 450, 455 215 USPQ 14, 18 (CCPA 1982). It raises just a issue of ambiguity regarding inventorship. Id. However, to clarify that ambiguity, submitted herewith is a Declaration by one of the inventors, Dr. Kratschmer. Dr. Kratschmer testifies that K. Fostiropoulous was working directly under Dr. Kratschmer in his laboratory. (See Paragraph 7 of Declaration) Furthermore, as testified by Dr. Kratschmer, the experiments described in the article which were performed by K. Fostiropoulous were conducted under the direction and supervision of Dr. Kratschmer (See Paragraph 8 of Declaration). Thus, based upon the explanation of Dr. Kratschmer in his Declaration, K. Fostiropoulous is not an inventor of the subject matter in the publication. Therefore,

the inventive entity of the article by Kratschmer, et al. is Kratschmer and Huffman, i.e., the inventive entity of the present application. Under these circumstances, the inventive entity of the article is the same as the inventive entity of the application. Thus, the article is not the work of another and thus does not qualify as prior art under 35 U.S.C. §102(a). Id. at 455-456, 215 USPQ at 18. Therefore, it is improper to cite Kratschmer, et al. as a reference.

Inasmuch as Kratschmer, et al. cannot be used as a reference, the '103 rejection cannot be based using the Kratschmer, reference; therefore, it is improper to use the combination of Kratschmer, et al. Hamilton, et al. and Kargin, et al. to reject the claimed subject matter. Therefore, the '103 rejection is overcome, and withdrawal thereof is respectfully requested.

Thus, in view of the amendment to the claims and the remarks hereinabove, and the Declaration of Dr. Kratschmer, it is respectfully submitted that the present case is in condition for allowance, which action is earnestly solicited.

Respectfully submitted,


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